CLAIMS:

1. A method for converting heat into mechanical work, in which a working medium is compressed in a cyclic process while giving off heat and is subsequently brought in thermal contact with the ambient environment via a first heat exchanger (16), is then expanded while obtaining mechanical work, whereupon the cyclic process is run through again, characterized in that the working medium, after expansion, is guided through another heat exchanger (18) which is situated inside a rapidly rotating rotor (13) and which, on the exterior thereof, is surrounded by at least one essentially annular gas chamber (17a, 17b, 17c, 17d) from whose exterior heat is dissipated.

2. A method according to claim 1, characterized in that the working medium is guided downstream of the rotor (13) through a compressor.

3. A method according to claim 1 or 2, characterized in that the working medium takes up ambient heat in the first heat exchanger (16).

4. A method according to one of the claims 1 to 3, characterized in that the working medium is guided essentially in the axial direction through the rotor (13).

5. A method according to one of the claims 1 to 4, characterized in that a temperature difference is built up in the rotor (13) of at least 100 K, preferably of at least 300 K and more preferably of at least 500 K.

6. A method according to one of the claims 1 to 5, characterized in that heat is dissipated via cooling ribs on the outside of the rotor (13).

7. A method according to one of the claims 1 to 5, characterized in that heat is dissipated via a third heat exchanger (19) on the outside of the rotor (13).

8. An apparatus for converting heat into mechanical work, comprising a rotor (13) with a heat exchanger (18) which can be flowed through substantially in the axial direction and which is delimited on its outside by a cylindrical wall, on the outside of which there is provided at least one substantially annular gas chamber (17a, 17b, 17c, 17d), characterized in that the heat exchanger (18) is provided with a substantially ring-cylindrical configuration, and that the gas chamber (17a, 17b, 17c, 17d) is subdivided in the radial direction into several ring-cylindrical partial chambers (17a, 17b, 17c, 17d).

9. An apparatus according to claim 8, characterized in that different gases are received in the individual partial chambers (17a, 17b, 17c, 17d).

10. An apparatus according to one of the claims 8 or 9, characterized in that a pressure control device is provided which is in connection with the ring-cylindrical partial chambers (17a, 17b, 17c, 17d) in order to set the internal pressure.

11. An apparatus according to claim 10, characterized in that the pressure control device is provided in the region of the axis of the rotor (13).

12. An apparatus according to one of the claims 8 to 11, characterized in that the ring-cylindrical partial chambers (17a, 17b, 17c, 17d) is separated from one another by cylindrical separating walls.

13. An apparatus according to one of the claims 8 to 12, characterized in that the feeding and discharging of the working medium occurs through the shafts (22, 26) of the rotor (13).

14. An apparatus according to one of the claims 8 to 13, characterized in that the rotor (13) is held in a housing (28) which comprises magnets (29) which exert an inwardly directed magnetic force on the circumference of the rotor.

15. An apparatus according to one of the claims 8 to 14, characterized in that the gas chamber (17a, 17b, 17c, 17d) is subdivided in the radial direction into at least three, preferably at least four ring-cylindrical partial chambers (17a, 17b, 17c, 17d).